

RISK MANAGEMENT INSPECTION REPORT

Suiza Dairy ***Aguadilla, Puerto Rico***

GENERAL INFORMATION

Stationary Source	Suiza Dairy
Date of Inspection	May 19, 2009
USEPA Inspector	Carlos Rivera, USEPA – Region II, Caribbean Office, Enforcement
Contract Inspector	Neil Mulvey, Sullivan Group (Subcontractor)
Description of Activities	<ul style="list-style-type: none">• Opening meeting with facility representative.• Review of documents related to process safety and the facility's ammonia refrigeration system.• Closing meeting with facility representatives. Facility inspection included the following activities: Document review Field verification Personnel interviews

STATIONARY SOURCE INFORMATION

Facility Location	Carr. 467, Km. 0.9 Bo. Camaseyes PO Box 1977 Aguadilla, PR Tel. (787) 891-0230
Number of Employees	143
Description of Surrounding Area	The facility is located in a largely residential section of Aguadilla, PR. The nearest resident is located immediately south of the compressor room, within 50-ft. of the facility. Another residence is located to the south within approximately 100-ft. Residential communities are located within 500-ft. to the east, southeast, and northeast.
Participants	Participants included representatives from: Carlos Rivera, USEPA – Region II, Caribbean Office Neil P. Mulvey, USEPA Contractor – Sullivan Group Adam Torres Pórez, Maintenance Manager, Suiza Dairy* * Lead representative for Suiza Dairy

1.0 BACKGROUND

The Suiza Dairy, Aguadilla, PR dairy produces dairy products including milk, orange juice, and other juices for distribution and sale to the consumer market. Milk production includes pasteurization, quality control, and bottling. Suiza also owns / operates a much larger dairy located in Rio Piedras, PR, which is the subject of a separate report.

Facility operations include a refrigeration system that utilizes anhydrous ammonia as a refrigerant. Anhydrous ammonia is a regulated substance under Section 112(r) of the Clean Air Act. A refrigeration system is regulated under Section 112(r) if it uses anhydrous ammonia above the designated threshold quantity of 10,000-lbs. Suiza has reported that the Aguadilla ammonia refrigeration system contains less than 10,000-lbs. of anhydrous ammonia. (See below for additional details regarding anhydrous ammonia inventory and the refrigeration system).

On June 28, 2007 the USEPA received complaints from nearby citizens regarding health effects allegedly related to inhalation of ammonia vapors from the Aguadilla facility. On June 30, 2007 the USEPA conducted an inspection of the Aguadilla facility in response to the citizen complaints. On September 26, 2007 the USEPA issued an Administrative Order to Suiza Dairy including direction to complete specific tasks related to design, maintenance, and operation of the ammonia refrigeration system. Subsequent to the 9/26/07, Suiza has submitted documents to the USEPA in response to the Administrative Order. (See below for a status of Suiza's response to the Order).

The purpose of the May 19, 2009 inspection was to:

- ❑ Evaluate Suiza's response to the work tasks specified in the 9/26/07 Order.
- ❑ Evaluate the design, operation, and maintenance of the Aguadilla ammonia refrigeration facility in comparison to good engineering practices.

2.0 AMMONIA REFRIGERATION SYSTEM

The ammonia refrigeration system includes the following equipment:

- Five Compressors
 - ⇒ 2 Vilter Compressors (125 Hp)
 - ⇒ 2 Crepaco Compressors (30 Hp)
 - ⇒ 1 Crepaco Compressor (100 Hp)
- Condenser
- Ammonia Receiver (T-45)
- Ammonia Recirculation Receiver (T-30)
- Ammonia Suction Trap Tank (T-29)
- Ammonia Chiller Surge Tank (T-51)
- Ammonia Surge Tank (IB-1)
- Ammonia Surge Tank (IB-2)
- Cold Room #1 Evaporators (8)

- Ice Builders (2)
- Glycol Chiller
- Storage Silos (6)
- Liquid Anhydrous Ammonia Piping
- Vapor Anhydrous Ammonia Piping

The majority of the ammonia handling equipment is located outside buildings or in partially enclosed workspaces.

Facility management reported that there are eight to ten anhydrous ammonia detectors located throughout the facility (did not know the exact number). The detectors were installed in 2007. Facility management had no records of the actual installation date nor did they have vendor information on the detector make, model, or operations manual. Facility management did not know the alarm setpoints of the detectors. The detectors are organized into six zones covering different areas of the facility as follows:

1. Cooler / storage area
2. T-30
3. Condenser area
4. Compressor area
5. Silos
6. Milk receiving area

According to facility management, the ammonia refrigeration system operates with three employees knowledgeable of the ammonia refrigeration system (the Maintenance Manager and two Industrial Mechanics). According to facility management, a knowledgeable operator is on-site at all times, with the following typical exceptions:

- Between 2:00 AM and 6:30 AM daily (estimated)
- Part of day on Saturday
- All day on Sunday
- Holidays

There are therefore significant blocks of time when the ammonia refrigeration system is operating without an ammonia refrigeration operator on-site.

3.0 STATUS OF RESPONSE TO 9/26/07 ADMINISTRATIVE ORDER

The 9/26/07 Administrative Order required that specific work be completed within 45-days of the effective date of the Order and within 60-days of the Order. The table below lists the required work items and an assessment of the status of those items as determined by reviewing documents submitted to the USEPA by Suiza and observations made during the 5/19/09 inspection.

Table 1. 45-Day Work Items (by 11/10/07)

ADMINISTRATIVE ORDER WORK ITEM	STATUS	COMMENTS
<p>Determine the total ammonia inventory at the facility, including ammonia contained within the refrigeration system and any additional ammonia stored at the facility. Determinations to be made by a professional engineer, after approval of said professional engineer by the USEPA. (Item No. 22.a.i)</p>	<p>During the 5/19/09 inspection, the facility provided the inspectors a copy of a report, "Ammonia Refrigeration System Inventory Calculation" for Suiza Dairy, Aguadilla, PR, dated November 2007, prepared by Bernabe Martir, P.E.</p> <p>This report states that based on the available data and limitations noted in the report, the best estimate of the ammonia present in the system is 8,256.94-lbs.</p> <p>This report also recommends that Suiza:</p> <ul style="list-style-type: none"> □ Prepare an ammonia system plot plan and include piping elevations. □ Prepare a piping and instrument diagram (P&ID) of the system, including all alarms and interlocks within the system. 	<p>Suiza did not comply with the requirement to seek EPA's approval of the professional engineer who would be performing the ammonia inventory calculations before completing the calculations.</p> <p>The inventory estimates did not include additional ammonia stored at the facility in pressurized cylinders, separate from the ammonia refrigeration system. At the time of the 5/19/09 inspection, three 150-lbs. anhydrous ammonia cylinders were observed in storage.</p>
<p>Have all ammonia systems and equipment at the facility leak-tested in accordance with current appropriate protocols and standards by a professional</p>	<p>No leak test was performed.</p>	<p>Good engineering practice specifies that leak tests of ammonia refrigeration systems be performed pre-startup and prior to the introduction of ammonia to the system, <u>never after start-up.</u></p>

engineer with appropriate experience. (Item No. 22.a.ii.)		
Submit to EPA a report detailing the results of the leak testing conducted pursuant to item 22.a.ii above. Together with the report, submit to EPA a schedule for the repair of leaks identified. (Item No. 22.a.iii.)		See above.

Table 2. 60-Day Work Items (by 11/25/07)

ADMINISTRATIVE ORDER WORK ITEM	STATUS	COMMENTS
Conduct an assessment of the physical integrity of all components of the ammonia systems at the facility, including, but not limited to, an evaluation of all piping, valves, vessels, and equipment. (Item 22.b.i)	<p>On 3/5/08 an outside contractor (Project Specialists of Puerto Rico, Inc.) performed an API-570 In-Service External Mechanical Integrity Assessment of the Ammonia Piping System at the Aguadilla facility. The assessment included an external visual inspection of the piping system, including an assessment of the pipe, supporting structures, and connecting flanges. The assessment also included an ultrasonic thickness test (UT) of the piping systems.</p> <p>On 3/5/08 an outside contractor (Project Specialists of Puerto Rico, Inc.) performed an API-510 External Mechanical Integrity Assessment to vessels #29, 30, and 45 at the Aguadilla facility. The</p>	<p>The assessments were not conducted within the required 60-day period.</p> <p>The assessments did not include all vessels and equipment utilized in the ammonia refrigeration system. For example, the assessment did not include the following equipment (including, but not limited to):</p> <ul style="list-style-type: none"> • Five Compressors • Condenser • Ammonia Chiller Surge Tank (T-51) • Ammonia Surge Tank (IB-1) • Ammonia Surge Tank (IB-2) • Cold Room #1

	assessment included a visual inspection and UT testing of these three vessels.	<p>Evaporators (8)</p> <ul style="list-style-type: none"> • Ice Builders (2) • Glycol Chiller • Storage Silos (6) <p>See Section 4.1 of this report regarding findings related to these Project Specialists Reports.</p>
The assessment shall include an evaluation of whether such equipment, including exhaust ventilation and relief vent lines, meets applicable codes, protocols, and standards, and shall address all items previously noted by EPA (i.e., only 1 ammonia detector at facility which was not operational; King valve not labeled). (Item 22.b.i)	There was no assessment available for review of an evaluation of whether such equipment, including exhaust ventilation and relief vent lines, meets applicable codes, protocols, and standards. There was no assessment addressing the items previously noted by EPA (i.e., only 1 ammonia detector at facility which was not operational; King valve not labeled).	Administrative Order item not addressed.
The assessment shall identify hazards which may result from accidental releases of anhydrous ammonia from the facility and make recommendations to be taken by the facility to prevent air releases of ammonia, and to minimize the consequences of accidental releases which do occur. (Item 22.b.i)	There was no assessment available for review identifying hazards which may result from accidental releases of anhydrous ammonia from the facility (i.e., process hazard analysis type review). There were no recommendations identified to prevent air releases of ammonia, and to minimize the consequences of accidental releases which do occur.	Administrative Order item not addressed.

<p>The assessment shall be conducted by a professional engineer with appropriate experience, after said professional engineer is approved by EPA. (Item 22.b.i)</p>	<p>The assessments completed as described above were conducted by Project Specialists of Puerto Rico, Inc.</p>	<p>Suiza did not comply with the requirement to seek EPA's approval of the professional engineer who would be performing the required assessments before completing the evaluations.</p>
<p>Report, in writing, to EPA all findings of the assessment performed pursuant to Item 22.b.i above, including recommendations regarding safety and release prevention improvements, certified by the engineer who conducted the assessment. Also submit a schedule for the performance of repairs or other actions recommended in the report (Item No. 22.b.ii)</p>	<p>Findings from the 3/5/08 Project Specialists External Mechanical Integrity Assessment of the Ammonia Piping System at the Aguadilla facility are documented in a report dated 3/13/08. Note that this report was in possession of EPA prior to the 5/19/09 inspection.</p> <p>Findings from the 3/5/08 Project Specialists External Mechanical Integrity Assessment to vessels #29, 30, and 45 at the Aguadilla facility are documented in a report dated 3/17/08. Note that this report was provided to the EPA during the 5/19/09 inspection.</p>	<p>The 3/13/09 and 3/17/09 reports included a list of recommendations designed to ensure the reliability and integrity of the piping systems and vessels (#29, #30, #45) inspected. There was no schedule provided for addressing the documented recommendations. As noted above, the assessment did not include all equipment utilized in the ammonia refrigeration system.</p>

4.0 FINDINGS

4.1 Findings Related to Project Specialists Reports

4.1.1 API-570 In-Service External Mechanical Integrity Assessment of the Ammonia Piping System at the Aguadilla facility – Report dated 3/13/08.

This assessment included a visual examination of pipe supports, piping systems, and flanges and connections. The assessment also included UT testing of piping, piping supports, elbows, bends, and reductions. Actual metal thickness measurements were recorded for various Thickness Measurement Locations (TMLs) throughout the piping, supports, elbows, bends, and reductions.

The report contains numerous recommendations designed to ensure reliability and integrity of the piping and piping systems evaluated. For example, some recommendations include (partial list only):

- ❑ Three areas in Line #1 were found to be corroded and need to be cleaned and re-coated with a suitable material in order to prevent further damage.
- ❑ Some support brackets on Line #2 need to be replaced due to severe corrosion.
- ❑ Pipe support on Line #5 needs to be replaced due to severe corrosion near TML #67.

More significantly however, the report states, *“After inspection and evaluation, it was determined that the pipe line #3 is not suitable for continuous operation under its actual conditions.”* Further, the reports states, *“Line #3 piping has several areas that need to be replaced due to severe corrosion.”*

The inspectors discussed these and other findings / recommendations from the piping system assessment with the facility’s Maintenance Manager. The Maintenance Manager displayed minimal understanding and awareness of the report, its findings / recommendations, or even where the severe corrosion was observed.

4.1.2 API-510 In-Service External Mechanical Integrity Assessment of Ammonia Service Pressure Vessels #29, 30, and 45 at the Aguadilla facility – Report dated 3/17/08.

This assessment included a visual inspection of vessels #29, #30, and #45, including the vessel foundations, shell, heads, attached appurtenances, and nozzles to the face of the vessel. The assessment also included UT testing of these items. Although the report included several recommendations to ensure the reliability and integrity of the vessels inspected, the report concluded that *“...vessels #29, 30, and 45 are suitable for continuous operation at its actual conditions.”*

The report strongly recommended that the facility perform an internal inspection of all its internal components per the current edition of API-510.

4.2 Findings Related to Facility Tour

The following findings are made as a result of observations made during the facility tour. Each finding is presented in two parts: first is a description of the observation, followed by **the related finding, presented in bold text**. These findings are not presented in a priority order.

- ❑ Facility management reported that the detectors were installed in 2007, but had no records of the actual installation date nor did they have vendor information on the detector make, model, or operations manual. **Typically included under Process Safety Information; needed to ensure proper operation and maintenance of the detectors.**
- ❑ Facility management did not know the alarm setpoints of the detectors. **Lack of knowledge of detector setpoints raises questions regarding the facility's response to alarms and ability to properly respond to alarms.**
- ❑ Facility management reported that the detectors have not been calibrated since their original installation. **Lack of calibration or testing of the detectors raises serious questions regarding the operability of the detectors to function properly in the event of a release.**
- ❑ During the tour, facility management brought the inspectors to the guard house to observe the ammonia detector alarm panel. (It was explained earlier that the ammonia detectors were organized into six zones and that the panel was located in the guard house to facilitate immediate response to an alarm). It was observed that the panel in the guard house only had two zones. Facility management then realized that he was showing the inspectors the fire alarm panel, not the ammonia detector panel. When the inspectors were brought to the ammonia detector panel (located on the second floor of a building just outside a production supervisor's office), it was observed that the panel was not operating. After several tries, facility management was unable to place the panel into service. **Lack of knowledge on the actual location of the ammonia detector alarm panel raises serious questions regarding the facility's understanding of the intended operation of this safety / warning system. When finally located, the fact that the detector panel was inoperative presents serious questions regarding the facility's ability to detect and respond to an ammonia release. The inoperative ammonia detection system could directly lead to employee injury and/or community impact.**
- ❑ It was observed during the USEPA's 6/30/07 site inspection and documented in the 9/26/07 Administrative Order that the King valve installed on the primary ammonia receiver (T-45) was not labeled, as required by good engineering practice. As observed during this facility tour, the King valve remains unlabelled. **Lack of labeling of the King valve could delay its closure during an emergency, potentially causing a more significant anhydrous ammonia release.**

- It was determined during the USEPA's 6/30/07 site inspection and documented in the 9/26/07 Administrative Order that the facility appeared to be adding significant quantities of anhydrous ammonia to the system on a regular basis (2001, 2004, 2005 (900-lbs.), 2006 (300-lbs.)). During the 5/19/09 inspection, the following charge records were reviewed:

4/15/08	300-lbs. charged
12/12/08	300-lbs. charged
1/23/09	300-lbs. charged

This totals 900-lbs. of ammonia charged to the system in a 10-month period (slightly more than 10% of the total calculated inventory of 8,257-lbs.). Facility management explained (as was documented in handwritten notes) that ammonia is typically added to the system following equipment maintenance (i.e., changing of compressor seals, installation of new solenoid valve, replacement of 3-way valve). **The need to regularly add ammonia to the system following equipment maintenance is an indication of excessive losses when opening equipment and possibly inadequate equipment pump down procedures. Possibly, ammonia could also be lost to the atmosphere due to fugitive release from pressure relief valves (PRVs) or other poorly maintained equipment.**

- During the facility tour a partially constructed building was observed. Facility management stated that this building may, when completed, be utilized for cold storage and therefore contain ammonia refrigeration equipment. **Good process safety and risk management practices dictate that process changes be managed through management of change and pre-start-up safety procedures.**
- Six-inch lines transferring hot, high pressure (est. 95 deg. F @ 170 PSIG) anhydrous ammonia vapor from compressors to the condensers are located on the roof of the compressor building. There were at least three points in that line with open-ended connections. **The only device protecting against a release of high temperature high pressure ammonia vapor to the atmosphere was a closed manual valve. A valve leak or inadvertent valve opening will directly lead to a release of high temperature high pressure ammonia vapor to the atmosphere. It was observed that a residential home was located within 75-ft. of the potential release point.**
- Several condensers on the roof above the compressor room have been taken out of service. Piping and valves are still in place, possibly connected to the 'live' system. A valve leak or inadvertent opening of a valve could directly lead to a release of high temperature high pressure anhydrous ammonia to the atmosphere. **It was observed that a residential home was located within 75-ft. of the potential release points. Good engineering practice specifies that out-of-service equipment be physically disconnected or blanked-off from operating equipment in order to eliminate the chance of accidental release.**

- ❑ 150-lb. cylinders of anhydrous ammonia were observed stored immediately adjacent to cylinders of acetylene and oxygen. **Compressed Gas Association (CGA) code prohibits the storage of toxic gases (anhydrous ammonia) with flammable gases (acetylene).**
- ❑ An emergency shutdown device (ESD) was observed near the anhydrous ammonia receiver (T-45). When manually activated, the ESD will automatically close the King valve on T-45. The ESD was positioned approximately 15-ft. from the manually operated King valve on T-45 (meaning an operator could just as easily manually close the King valve as operate the ESD). **Good practice would dictate that an ESD be installed at a location where remote activation would be more useful in closing the King valve remotely (for example, near the ammonia detection panel where an ammonia leak might first be detected), thereby gaining best use of the remote shutdown.**
- ❑ A 2,000-gallon oil storage tank is located within 10-ft. of the ammonia receiver (T-45). **Good engineering practice requires that flammables and combustibles stored in location separate from toxic materials (anhydrous ammonia).**
- ❑ Ventilation fans are located in the compressor area. The ventilation fans are not equipped with fan failure alarms and are not activated based on ammonia detection. **ASHRAE-15 requires that ventilation fans in compressor rooms be installed with fan failure alarms or emergency start-up based on ammonia detection, in order to ensure that the LEL of ammonia is not achieved in the event of an ammonia release.**
- ❑ A ventilation fan located in the compressor area discharges on the other side of a wall near ammonia vessel T-30. Facility employees are regularly in the area of T-30 since this tank is open to a walk-way. In the event of an ammonia leak in the compressor area, ammonia vapors would be transported to this area, directly exposing employees to ammonia vapors. **Good engineering practice dictates that exhaust ventilation fans be vented to a safe location, ensuring that employee exposure cannot occur.**

4.3 Findings Related to Document Review

The following findings are based on a review of documents review related to the ammonia refrigeration system and risk management / process safety. Each finding is presented in two parts: first is a comment related to the document reviewed, followed by **the related finding, presented in bold text**. These findings are not presented in a priority order. Note that findings related to reports prepared by Project Specialists are addressed in Table 2 and Sections 4.1.1 and 4.1.2 above.

- ❑ No site plan or facility plot plan was available for review. **A facility site plan / plot plan is typically included as part of process safety information and is considered an important document in understanding and communicating equipment layout and is considered critical in emergency response and planning.**
- ❑ No legible piping and instrument diagram (P&ID) of the ammonia refrigeration system was available for review. The facility did provide a P&ID of the system, however it was not legible and appeared incomplete. **A P&ID is typically included as part of process safety information and is considered an important document in understanding the design and operation of the system and critical in helping to identify potential process hazards and safeguards. The P&ID is also important in that it lists all relevant equipment and instruments in the ammonia refrigeration system and is therefore important in ensuring that necessary preventive maintenance inspection and test schedules are developed for such equipment.**
- ❑ Several pressure relief valves (PRVs) are installed throughout the ammonia refrigeration system. Facility management stated that there was no record or documentation available regarding inspection / test or replacement of the PRVs. **Good industry practice recommends that PRVs be regularly inspected and changed / replaced on a five-year schedule in order to ensure operational integrity.**
- ❑ Facility operation requires that anhydrous ammonia be added to the system on a regular basis and that oil be drained from equipment on a regular basis. No written operating procedures were available for review addressing these activities. These manual operations present a risk of accidental release if performed incorrectly. **Good engineering practice dictates that written operating procedures be prepared for these activities to ensure safe and consistent operations.**